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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
RUGGLES, JOHN S	

ART UNIT	PAPER NUMBER
1756	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/614,345	KURIHARA ET AL.	
	Examiner	Art Unit	
	John Ruggles	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8 and 10-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-8 and 10-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In the current submission filed on 4/23/07, claims 1 and 7 are currently amended, claims 2-3, 9, and 13-14 remain as previously cancelled, and claims 4-6, 8, and 10-12 remain as previously presented. Therefore, only claims 1, 4-8, and 10-12, as currently amended, remain under consideration.

The previous specifically exemplified objections to the specification title and those numbered (7)-(9) are withdrawn in view of current amendments and accompanying remarks.

A new rejection under the first paragraph of 35 U.S.C. 112 is set forth below, as necessitated by the current amendment.

The previous rejection under the second paragraph of 35 U.S.C. 112, the previous art rejections under 35 U.S.C. 103(a), and the previous nonstatutory obviousness-type double patenting (ODP) rejections are each maintained below in revised form, as necessitated by the current claim amendment.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 4-8, and 10-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contain subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the

relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In each of claims 1 and 7, the currently added limitation "the duty ratio is *highest* at a center position of the substrate, and *decreases* proportionally toward both peripheral portions of the substrate" (emphasis added) is *not* fully supported by the original disclosure. On page 7 of the current amendment in the remarks section, Applicants rely on page 7 lines 27-29 of the original specification, but this passage only defines the "duty ratio" as being the ratio of groove width to the ridge width between grooves (on the instant phase mask). Applicants also rely on instant Figure 1B, but this drawing does not provide sufficient support for the currently added claim limitations, which include ***new matter*** that must be cancelled from the claims. Figure 1B seems to show that the groove width (W_0) is **lowest** (500nm wide) at the center plane or position A_0 (as coordinated to the grooved phase mask 21 illustrated by instant Figure 1A) and **increases** in steps upward at regular intervals *in a direction perpendicular to the grooves* toward both peripheral portions of the substrate, where the groove width is highest (850nm wide). Since both claims 1 and 7 require that the groove pitch is constant across the phase mask and Figure 1B shows that the groove width increases *in a direction perpendicular to the grooves* outward along the phase mask, the ridge width must also necessarily decrease proportionately to maintain the constant groove pitch. This means that the duty ratio on the phase mask is **lowest** at the center position of the substrate and **increases** *in a direction perpendicular to the grooves* toward both peripheral portions of the substrate, which is the interpretation of this currently added limitation in claims 1 and 7 for the purpose of this Office action (in accordance with Figure 1B as described

in the original specification at page 12 lines 29-34). Claims 4-6 depend from claim 1 and claims 8 and 10-12 depend from claim 7.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4-8, and 10-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In each of claim 1 line 12 and claim 7 line 16, the exact meaning of "apodization exposure" in the original disclosure is still unclear. Page 3 lines 18-23 of the specification state, in part, "the irradiation method (line 18)...through a phase mask to form a diffraction grating (lines 20-21)...needs to carry out apodization to modulate the refractive index of the optical fiber axially (lines 21-23)". For the purpose of this Office action and in order to advance the prosecution of this application, the above statement from the specification is understood to suggest that "apodization exposure" was *intended to* --modulate or change the refractive index by selective exposure through a phase mask having a plurality of grooves-- (e.g., to form a diffraction grating in an optical fiber or optical waveguide, etc.). Nevertheless, Applicants are apprised that recitations directed to the manner in which the phase mask is intended to be used do not distinguish the instant claims to a phase mask or methods of fabricating phase masks from those of the prior art (otherwise having the same actual structural phase mask limitations or the same positively recited steps of fabricating phase masks), when the prior art has the capability to so perform. See MPEP § 2114 and *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Furthermore, "the recitation of a new intended use for an old product does not make a

claim to that old product patentable", *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). Claims 4-6 depend on claim 1 and claims 8 and 10-12 depend on claim 7.

Applicants' arguments on pages 7-8 in the remarks section of the current amendment are acknowledged, but they are still not persuasive and do not conclusively show that the newly argued meaning for "apodization exposure" was present in the instant disclosure as originally filed. In fact, both of the internet references now relied upon by Applicants are dated 4/20/07.

Claim Rejections - 35 USC § 103

The previous prior art rejections under 35 U.S.C. 103(a) are maintained below in revised form over the same prior art references already of record, as necessitated by current claim amendments.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-8, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segawa et al. (US 6,214,495) in view of Inoue et al. (US 6,251,544).

Segawa et al. '495 teach a phase mask (phase shift mask, PSM) for patterning an optical fiber and a method of manufacturing the phase mask (PSM, title, abstract). Figure 2(b) shows the phase mask 21 having a surface of alternating grooves 26 and strips 27 for making a Bragg diffraction grating in an optical fiber (col. 4 lines 53-55, which also reads on an optical waveguide and an optical guide, *instant claims 5, 6, 11, and 12*). The phase mask (PSM) parallel groove pitch is varied in the range of 0.85-1.25 μm (col. 3 lines 25-26 and col. 4 lines 1-3, which

encompasses the instant pitch of 1.06 μm) by linear or non-linear increase(s) or decrease(s) in pitch between grooves, depending on the position of each groove 26 (either perpendicular to or in the direction of the groove 26) on the PSM (col. 6 lines 45-50). The variation in pitch between the grooves at different positions across the PSM is also expressly described to correspond with changes in widths of the grooves (col. 5 lines 7-12, which reads on the instant plurality of grooves having a duty ratio adjusted according to the positions of the grooves by adjusting the respective spacing between the grooves and/or the respective widths of the grooves). The method of manufacturing the phase mask (PSM) is shown in Figures 6(a)-6(h), which are very similar to instant Figures 2A-2I, and includes forming a chromium (Cr) film on a quartz substrate, patterning a resist on the Cr by multiple exposures with electron beams (*instant claims 8 and 10*), dry etching the Cr through the resist pattern using a CH_2Cl_2 gas, then etching the quartz substrate through the resist and Cr patterns to an exact depth in the range of 200-400 nm by controlling etching time using a CF_4 gas, and removing the remaining resist, as well as removing all of the remaining Cr to form a completed phase mask 21 having grooves 26 in the quartz substrate 11 (as shown in Figure 6(h) without any Cr remaining thereon, col. 7 line 44 to col. 8 line 37, which reads on *instant claim 1* for a phase mask having a pattern of a plurality of grooves in which the pattern is entirely transparent and *instant claim 7* for a corresponding method of making such a phase mask, as well as reading on the instant PSM groove depth of 250nm and reading on the instant PSM groove duty ratio adjusted according to positions of the grooves by adjusting the respective depths of the grooves).

Segawa et al. '495 do not specifically teach ***[1]*** a single constant pitch for the phase mask (PSM) grooves at varying duty ratios or ***[2]*** that the duty ratio is lowest at a center position of the

substrate and increases proportionately in a direction perpendicular to the grooves toward both peripheral portions of the substrate (*instant claims 1 and 7*).

However, Inoue et al. Figures 12A and 12B illustrate a mask having a single constant pitch across lines and spaces (lands and grooves) at varying duty ratios (col. 9 lines 15-34), wherein the duty ratios can be increased in a direction perpendicular to the grooves toward a peripheral portion of the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the phase mask (PSM) having an entirely transparent pattern of a plurality of grooves in a transparent substrate at varied pitch, each of the grooves having a duty ratio dependent on a position of the respective groove on the mask and the corresponding method of manufacturing it taught by Segawa et al. '495 by changing the phase mask (PSM) grooves to a single constant pitch while still varying the duty ratios ***[1]***, wherein the duty ratios can be increased in a direction perpendicular to the grooves toward a peripheral portion of the substrate ***[2]***, because this is a known configuration shown by Inoue et al. The resulting phase mask (PSM) would have the same structural limitations as instantly claimed and the method of manufacturing it would have the same steps as instantly claimed. Therefore, the phase mask (PSM) and method of making it taught by Segawa et al. '495 and Inoue et al. are inherently capable of being used for patterning a diffraction grating in an optical guide, an optical waveguide, or an optical fiber (e.g., having a discontinuously changing period, etc., *instant claims 1, 4-8, and 10-12*).

Claims 1, 4-8, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al. (EP-936505 A1) in view of Maisenhoelder et al. (US 2002/0076154) and further in view of Inoue et al. (US 6,251,544).

Kurihara et al. teach a method of making a phase mask (phase shift mask, PSM) for patterning a Bragg diffraction grating in an optical fiber (title, which also reads on an optical waveguide or an optical guide, *instant claims 5, 6, 11, and 12*). The phase mask (PSM) parallel groove pitch is usually in the range of 0.85-1.25 μm ([0017], which encompasses the instant pitch of 1.06 μm). The method of manufacturing the phase mask (PSM) is shown in Figures 4(a)-4(h), which are very similar to instant Figures 2A-2I. The method includes forming a chromium (Cr) film on a quartz substrate, patterning a resist on the Cr by multiple exposures with electron beams or alternatively with laser light ([0016, 0037], *instant claim 10*), dry etching the Cr through the resist pattern using a CH_2Cl_2 gas, then etching the quartz substrate through the resist and Cr patterns to a depth in the range of 200-400 nm by specifically controlling etching time using a CF_4 gas, and removing the remaining resist, as well as removing all of the remaining Cr to form a completed phase mask 21 having grooves 26 in the quartz substrate 11 (as shown in Figure 4(h) without any Cr remaining thereon, [0027-0034], which reads on *instant claim 1* for a phase mask having a pattern of a plurality of grooves in which the pattern is entirely transparent and *instant claim 7* for a corresponding method of making such a phase mask having a plurality of grooves in which the pattern is entirely transparent, as well as reading on the instant PSM groove depth of 250 nm).

While teaching a phase mask (PSM) having very similar structural limitations and a method of manufacturing a phase mask (PSM) having very similar steps as instantly claimed,

Kurihara et al. do not specifically teach: ***[1]*** a single constant pitch for the phase mask (PSM) grooves at varying duty ratios according to the positions of the grooves on the mask; ***[2]*** that the duty ratio is lowest at a center position of the substrate and increases proportionately in a direction perpendicular to the grooves toward both peripheral portions of the substrate (*instant claims 1, 7-8, and 10-12*); and ***[3]*** in which the PSM is *intended for* forming a diffraction grating having a discontinuously changing period (*instant claim 4*).

Maisenhoelder et al. teach a waveguide plate and a process for making the waveguide plate (title, abstract). The waveguide plate is made by patterning through a phase mask (phase shift mask, PSM) 14 made by forming a diffraction grating having parallel grooves in a quartz substrate 15, as shown by Figures 7a-7g. The process of making the PSM diffraction grating includes etching the quartz substrate 15 through a resist pattern 16, removing remaining resist to form a diffraction grating pattern of parallel grooves in the PSM substrate 15, covering with chromium (Cr) 17, etching Cr 17 through a second resist 18 patterned by electron or laser beams, and removing the residual second resist 18 to complete the phase mask (PSM) 14 [0148-0149]). A waveguide coupler 23 (shown in Figure 10) having a coupling grating 3 (shown in Figures 8a and 8b) with a constant grating period [0157-0158] is made by a phase mask (PSM) having an appropriately (e.g., linearly, etc.) varying grating pattern (e.g., of parallel grooves, etc.) [0164]. The transmissivity of the coupler 23 is a sensitive function of the wavelength and the grating period, which vary depending on position [0166]. The phase mask (PSM) grating pattern is adjusted by changing the groove-to-land ratio (reading on the instantly defined "duty ratio") and the grating or groove depth, which are both readily calculated with the aid of known programs [0172].

The teachings of Inoue et al. are discussed above.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the phase mask (PSM) having an entirely transparent pattern and the method of manufacturing such a phase mask (PSM) for patterning a diffraction grating in an optical fiber (or an optical waveguide or an optical guide) taught by Kurihara et al. by changing the phase mask (PSM) groove-to-land ratio (or duty ratio of the grooves) according to the positions of the grooves on the mask ***[1]***, wherein the duty ratios can be increased proportionately in a direction perpendicular to the grooves toward a peripheral portion of the substrate ***[2]***, and in which the PSM is *intended for* forming a diffraction grating having a discontinuously changing period ***[3]***. This is because Maisenhoelder et al. teach that a phase mask (PSM) grating pattern (*intended for* forming a waveguide plate or diffraction grating) was known at the time of the invention to be readily adjusted by changing the groove-to-land ratio (reading on the instantly defined "duty ratio" of the grooves) and the grating or groove depth of the phase mask (PSM) grating pattern. Since Maisenhoelder et al. teach that a waveguide with a constant grating period is made by patterning through a phase mask (PSM) having a linearly varying grating pattern, one of ordinary skill in the art would reasonably expect a waveguide or diffraction grating having a discontinuously changing period to be obtained by patterning through an appropriately structured phase mask (PSM) (e.g., having a grating pattern of parallel grooves at varying duty ratio as taught by Maisenhoelder even while still having a single constant pitch wherein the duty ratio can be increased proportionately in a direction perpendicular to the grooves toward a peripheral portion of the substrate as a known combination of mask features taught by Inoue et al., etc.).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 7-8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, and 7-9 of U.S. Patent No. 6,795,614 (Segawa et al. '614) in view of Segawa et al. (US 6,214,495, as discussed above) and Inoue et al. (US 6,251,544, as discussed above). The conflicting claims of Segawa et al. '614 are not identical to the instant claims, at least because the Segawa et al. '614 patent claims recite a method of making a phase mask (PSM) to produce a repeating diffraction grating pattern in an optical fiber, in which the PSM has a transparent substrate with a pattern of grating shaped grooves and strips on one surface thereof that form patterns with varying groove pitch (0.85 μm to 1.25 μm) according to groove positions on the PSM, the groove to strip width ratio is uniform, and the grooves are patterned on the PSM by either an electron beam writing system or a laser beam

writing system (apparently the PSM groove pattern is entirely transparent as shown in Fig 4(h)); whereas the instant claims require a method of making a PSM having an entirely transparent pattern of grooves at a single pitch with varying duty ratio by varying groove widths depending on groove positions on the PSM, wherein the duty ratio is lowest at a center position of the substrate and increases proportionately in a direction perpendicular to the grooves toward both peripheral portions of the substrate, and in which the PSM is intended for forming a diffraction grating in an optical medium, optical guide, or an optical fiber. The Segawa et al. '614 patent claims also do not specifically recite other instantly claimed limitations that are taught by Segawa et al. '495 and Inoue et al.

However, it would still have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of making a phase mask (PSM) having an entirely transparent pattern of a plurality of grooves at varied pitch in a transparent substrate, each of the grooves having a duty ratio dependent on a position of the respective groove on the mask taught by Segawa et al. '614 by changing the phase mask (PSM) grooves to a single constant pitch while still varying the duty ratio, wherein the duty ratio can be increased proportionately in a direction perpendicular to the grooves toward a peripheral portion of the substrate, because this is a known configuration shown by Segawa et al. '495 in combination with Inoue et al. The method of manufacturing the phase mask (PSM) would have the same steps as instantly claimed and the resulting PSM would have the same structural limitations as the instant phase mask. Therefore, the phase mask (PSM) made by the method taught by Segawa et al. '614, Segawa et al. '495, and Inoue et al. is inherently capable of being used for patterning a diffraction grating in

an optical guide, an optical waveguide, or an optical fiber (e.g., having a discontinuously changing period, etc., *instant claims 7-8 and 10-12*).

Claims 7-8 and 10-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, and 7-9 of U.S. Patent No. 6,795,614 (Segawa et al. '614) in view of Kurihara et al. (EP-936505 A1, as discussed above), Maisenhoelder et al. (US 2002/0076154, as discussed above), and Inoue et al. (US 6,251,544, as discussed above). The conflicting claims of Segawa et al. '614 are not identical to the instant claims, at least because the Segawa et al. '614 patent claims recite a method of making a phase mask (PSM) to produce a repeating diffraction grating pattern in an optical fiber, in which the PSM has a transparent substrate with a pattern of grating shaped grooves and strips on one surface thereof that form patterns with varying groove pitch (0.85 μm to 1.25 μm) according to groove positions on the PSM, the groove to strip width ratio is uniform, and the grooves are patterned on the PSM by either an electron beam writing system or a laser beam writing system (apparently the PSM groove pattern is entirely transparent as shown in Fig 4(h)); whereas the instant claims require a method of making a PSM having an entirely transparent pattern of grooves at a single pitch with varying duty ratio by varying groove widths depending on groove positions on the PSM, wherein the duty ratio is lowest at a center position of the substrate and increases proportionately in a direction perpendicular to the grooves toward both peripheral portions of the substrate, and in which the PSM is intended for forming a diffraction grating in an optical medium, optical guide, or an optical fiber. The Segawa et al. '614 patent claims also do not specifically recite other instantly claimed limitations that are taught by Kurihara et al., Maisenhoelder et al., and Inoue et al.

However, it would still have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of making a phase mask (PSM) having an entirely transparent pattern for patterning a diffraction grating in an optical fiber (or an optical waveguide or an optical guide) taught by Segawa et al. '614 by changing the phase mask (PSM) groove-to-land ratio (or duty ratio of the grooves) according to the positions of the grooves on the mask while maintaining a single constant pitch, wherein the duty ratio can be increased proportionately in a direction perpendicular to the grooves toward a peripheral portion of the substrate, and in which the PSM is *intended for* forming a diffraction grating having a discontinuously changing period. This is because Kurihara et al. in combination with Maisenhoelder et al. teach that a phase mask (PSM) grating pattern (*intended for* forming a waveguide plate or diffraction grating) was known at the time of the invention to be readily adjusted by changing the groove-to-land ratio (reading on the instantly defined "duty ratio" of the grooves) and the grating or groove depth of the phase mask (PSM) grating pattern. Since Maisenhoelder et al. teach that a waveguide with a constant grating period is made by patterning through a phase mask (PSM) having a linearly varying grating pattern, one of ordinary skill in the art would reasonably expect a waveguide or diffraction grating having a discontinuously changing period to be obtained by patterning through an appropriately structured phase mask (PSM) (e.g., having a grating pattern of parallel grooves at varying duty ratio as taught by Maisenhoelder even while still having a single constant pitch, wherein the duty ratio can be increased proportionately in a direction perpendicular to the grooves toward a peripheral portion of the substrate, as a known combination of mask features taught by Inoue et al., etc.).

Response to Arguments

Applicants' current amendment and accompanying arguments on pages 7-14 with respect to claims 1, 4-8, and 10-12 have been fully considered, but they are either moot or unpersuasive in view of the new and maintained ground(s) of rejection (which are necessitated by the current amendment).

On pages 8-9 and throughout the remainder of the current amendment remarks section ending on page 14, Applicants rely on the new matter currently added to independent claims 1 and 7. However, this new matter is not persuasive, at least because it must be removed from the claims (as indicated above).

On pages 9-10 (under section 1 beginning at the bottom of page 9), Applicants argue against Segawa et al. '495 alone as not teaching or suggesting varying width grooves at a single pitch on the phase mask substrate. In response to Applicants' argument against the reference(s) individually (e.g., Segawa et al. '495, etc.), one cannot show nonobviousness by attacking reference(s) individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicants also assert that Inoue et al. nowhere teach or suggest varying width grooves at a single pitch on a mask substrate. However, Inoue et al. Figures 12A and 12B do, in fact, illustrate a mask having a single constant pitch across lines and spaces (lands and grooves) at varying duty ratios (col. 9 lines 15-34), wherein the duty ratios can be increased in a direction perpendicular to the grooves toward a peripheral portion of the substrate (as discussed above).

In response to Applicants' argument on page 12 that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, the teachings relied upon in the rejections set forth above come from knowledge that was within the level of ordinary skill at the time of the claimed invention, as exemplified by the cited references. In particular, (a) varying the groove-to-land ratio (or duty ratio of the grooves) while maintaining the same single pitch between grooves and (b) varying the groove width depending on position across the mask are found in the combination of cited prior art references (e.g., Kurihara et al., Maisenhoelder et al., and Inoue et al., etc.), as discussed above. Therefore, no improper hindsight reasoning has been relied upon and this argument set forth by Applicants is unpersuasive.

Conclusion

Applicants' amendment necessitated the new and revised ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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